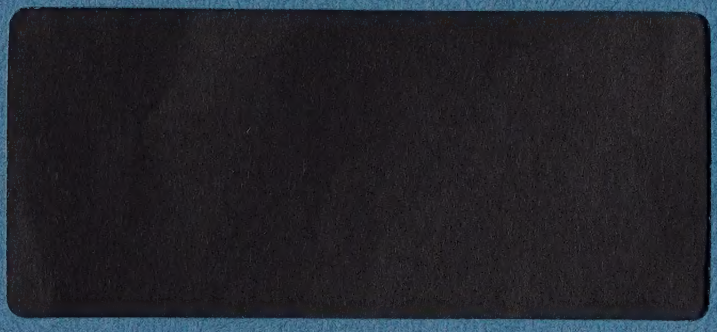


MP MASTER
MA30026

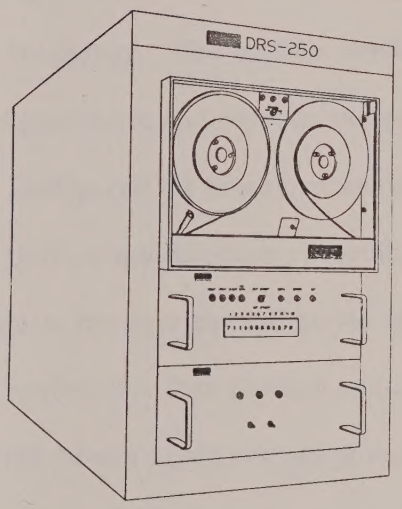
FAIRCHILD
ELECTRO-METRICS
CORPORATION

FAIRCHILD
ELECTRO-METRICS
CORPORATION
A SUBSIDIARY OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION
100 CHURCH STREET • AMSTERDAM, NEW YORK 12010

DRS-250

DIGITAL DATA RECORDING

SYSTEM



EQUIPMENT DESCRIPTION
AND SPECIFICATIONS

MAY 1970

FAIRCHILD
ELECTRO-METRICS CORPORATION

DIGITAL DATA RECORDING SYSTEM

MODEL DRS-250

Introduction

The new Fairchild/Electro-Metrics' Model DRS-250 Data Recording System allows digital recording of the amplitude, attenuation, band, frequency and control information from Electro-Metrics' line of electromagnetic measurement equipment such as the EMC-25 Receiver/Interference Analyzer and the FSS-250 Spectrum Surveillance System. The DRS-250 Data Recording System accepts digital control, band and attenuator setting information along with analog frequency information and relative signal amplitude at that particular frequency. The system converts the frequency and relative amplitude information into digital form and records the results on an IBM compatible tape recorder. The data is configured for later processing on any off-line batch process computer which will accept IBM compatible tape recordings. The Model DRS-250 Data Recording System thus brings to the user the full power of any batch process computer along with its varied output devices for data plotting and report configuration. Most large batch process computers have a large variety of output devices for graphic and printed presentation of data and analyses performed on these data. Therefore, data reductions for reports becomes very routine.

A computer is not required for recording the data in the field. Thus, the user can record data and take the resulting tape to his corporate computing center for scheduling into the normal computing cycle. While the data is being reduced or analyzed in accordance with the user's directions, he can continue to run other tests and accumulate more data, since the measurement system is not tied up during the analysis cycle.

TECHNICAL DESCRIPTION

The attached block diagram (Figure 1) illustrates the DRS-250 Data Recording System to be used with Fairchild/Electro-Metrics Corporation's instrumentation such as the EMC-25 or the FSS-250 Spectrum Surveillance System. The Data Recording System is complete and includes all necessary buffering and data handling circuitry to accept input data and record it on a digital (incremental) tape recorder which is also supplied.

The inputs to this system consist of digital signals for control, band indication and attenuator setting information. The X and Y axis data are input to the system in analog form.

For digital recording, the control, band and attenuation data is buffered and the X and Y axis information is buffered and converted to two digital words by two analog to digital converters. All information is then supplied to the digital tape recorder interface for subsequent recording.

The system clock is used to adjust the sample rate of the system. For narrow receiver bandwidths, the use of a slow clock rate is possible. Wideband measurements must use a faster clock. In practice, the clock rate can be set at the start of a run to insure that optimum data recording is obtained during that run.

The digital tape recorder interface organizes the parallel data received from the analog to digital converters and logic conditioners into the proper format for transmission to the digital incremental tape recorder. The data supplied to the recorder is

recorded on eight tracks. The ninth track is used for a parity bit for subsequent data checking.

The whole system, including the tape recorder, is furnished by Fairchild/Electro-Metrics Corporation as a complete and package unit, including the modifications necessary for connecting the system to the data gathering instrument(s) such as the Model FSS-250 Spectrum Surveillance System.

SYSTEM USE

The use of the Model DRS-250 Data Recording System can be divided into three phases. These are calibration, normal recording, and data reduction phases.

Calibration of the system is accomplished by feeding a known constant level input such as an impulse into the FSS-250 system and making a run of the system response versus frequency. During the run, the output of the FSS-250 system is recorded on the digital tape recorder and the result is a system calibration tape which can be used with later data tapes to perform computer analysis and obtain accurate information from measurements on unknown signals or data.

Normal recording of data is accomplished by operating the acquisition system or instruments in their normal fashion and recording the outputs on the digital tape recorder. Once the data has been obtained, digitized and recorded, the tape may be taken to a large batch process computer for analysis.

Data reduction is a simple process, as illustrated by Figure 2 which is an illustrative block diagram of possible computer routine for reduction of data recordings from the DRS-250 System.

Input data to the computer consists of a calibration and factor tape containing current probe, antenna and system calibration information versus frequency and the data input tape obtained from measurement of unknown signals. (The calibration information is prepared from a calibration run--described previously--which is performed on the systems periodically.) Band versus frequency information for the receivers, such as the EMC-25 which are used in the Data Acquisition System, must also be stored in the computer prior to running an unknown data tape.

The computer program begins by reading one 31 bit data record from the data tape, consisting of one control bit, four bits of band information, six bits indicating attenuator setting and the X and Y axis amplitudes, which consist of 10 data bits each. The data is checked for validity (i.e., for the presence of a control bit) or indication that the system was in the normal data recording mode during the recorder cycle which produced the record. If the data is valid, the four bit band information is used to look up the lower and upper band edge frequencies from the band-frequency array stored in the computer. Using a sweep voltage constant, the slope of frequency versus sweep amplitude (M) can be calculated and subsequently used to determine the incremental frequency change (Δf) for a given reading. The incremental frequency change (Δf) can then be added to the lower band edge frequency (fL) to obtain the absolute frequency (f). Since a new incremental frequency value is determined for each data word, no error is accumulated.

Once the absolute frequency (f) is determined, the probe, antenna and calibration factors may be obtained from the factor table and used to calculate the absolute amplitude of the signal. The absolute amplitude of the signal is calculated by adding to the relative

amplitude the calibration factor and the antenna or probe factors.

The absolute amplitude and frequency information, once determined, can be used in any form of analysis desired or may be plotted, annotated, or otherwise processed for use in reports. Line printers, digital plotters and other versatile output devices are normally a part of a well equipped batch process computing facility. This allows the information to be recorded as a printed or graphic copy for later reference or direct use in certification reports and other documents.

CONCLUSION

The Model DRS-250 Data Recording System is designed to make optimum use of the versatile data acquisition characteristics of Fairchild/Electro-Metrics Corporation's line of electromagnetic signal acquisition equipment and systems. However, the system will record any information consisting of three digital signals of 1, 4, and 6 bits each in length and two analog data channels. Electro-Metrics Corporation's systems engineers will be pleased to discuss your recording requirements and recommend a system to fulfill your requirements. Please contact the Fairchild/Electro-Metrics representative in your area or the Electro-Metrics' Marketing staff, in Amsterdam, N.Y. Area Code 518/843-2600.

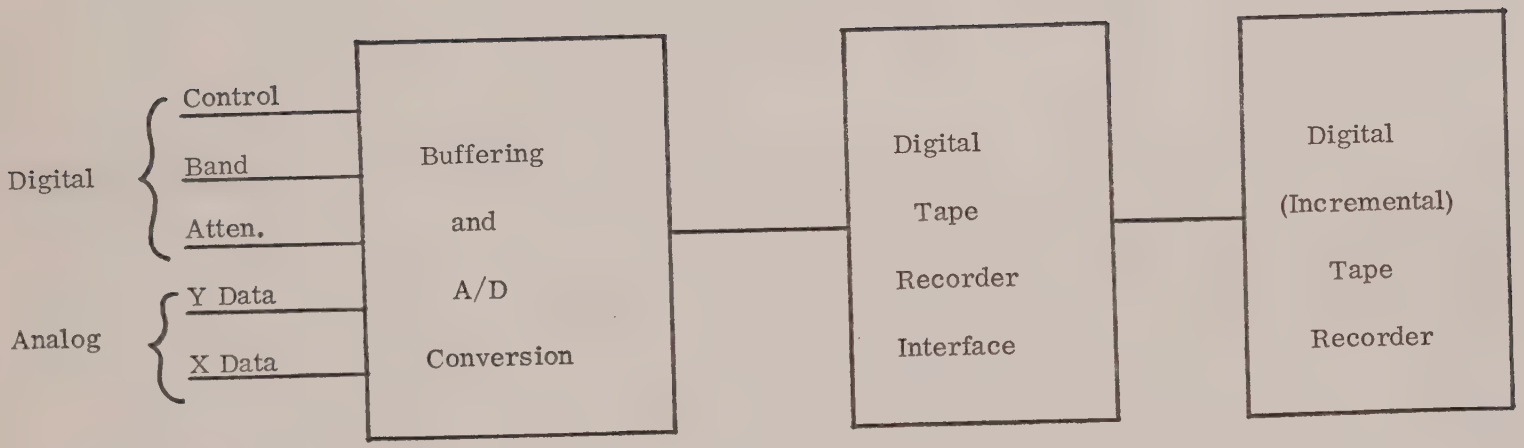


Figure 1. DRS-250 DIGITAL DATA RECORDING SYSTEM

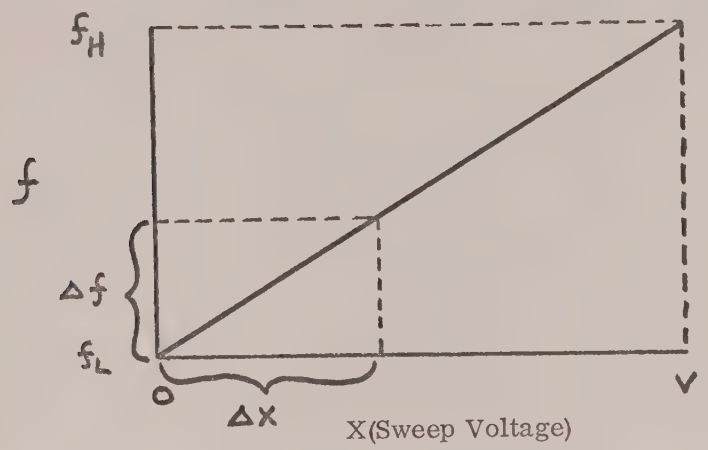
DRS-250 DATA RECORDING SYSTEM

DATA STRUCTURE

RECORDED DATA
(1 Record = 32 Bits)

Word	Length	Data
1	1 Bit	Control
2	4 Bits	Band Number
3	6 Bits	Attenuator Setting
4	10 Bits	X Axis (Sweep Voltage) Amplitude
5	10 Bits	Y Axis (Relative Signal) Amplitude
6	1 Bit	Not Used

I. Computer Calculation To Determine Frequency From DRS-250 Recorded Data



Definitions:

fL = Lower Band Edge Frequency

fH = Upper Band Edge Frequency

V = Maximum Sweep Voltage (Constant)

ΔX = Instantaneous Sweep Voltage Magnitude

Δf = Frequency Deviation From Lower Band Edge

Calculation:

Slope: $M = \frac{fH - fL}{V}$ (Constant for each band)

Deviation: $\Delta f = M \cdot \Delta X$

Frequency: $f = fL + \Delta f$

II. Calculation To Determine Absolute Signal Amplitude In dBμa/MHz or dBμV/M/MHz

Amplitude = Y_{dB} + (probe or antenna factor)$_{dB}$ + (receiver calibration factor)$_{dB}$

Y = Relative Signal Amplitude From DRS-250 Tape

1. Probe or antenna factors are obtained from calibration charts for these devices.

2. Receiver calibration factor is obtained from DRS-250 calibration run.

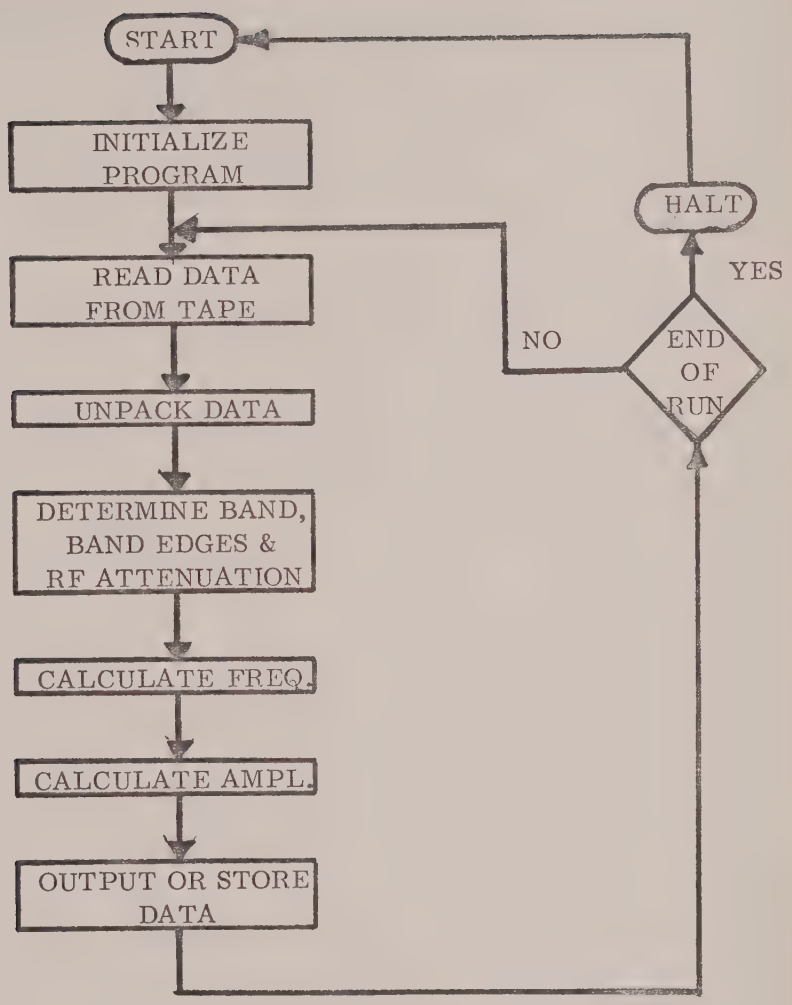


Figure 2. BLOCK DIAGRAM OF

DRS-250 DATA REDUCTION CALCULATION

DRS-250

SYSTEM DESCRIPTION

AND

OPERATING SUMMARY

1.0 GENERAL

This equipment description covers the complete DRS-250 Digital Data Recording System which allows digital recording of the amplitude, attenuation, band, frequency and control information from Electro-Metrics' line of electromagnetic measurement equipment such as the EMC-25 Receiver/Interference Analyzer and the FSS-250 Spectrum Surveillance System.

The DRS-250 Data Recording System accepts digital control, band and attenuator setting information along with analog frequency information and relative signal amplitude at that particular frequency. The system converts the frequency and relative amplitude information into digital form and records the results on an IBM compatible tape recorder. The data is configured for later processing on any off-line batch process computer which will accept IBM compatible tape recordings. The Data Recording System is designed to bring to the user the full power of any batch process computer along with its varied output devices for data plotting and report configuration.

2.0 SYSTEM DESCRIPTION

The DRS-250 Digital Data Recording System consists of Electro-Metrics' Model DRI-250 Digital Recording Interface coupled to a DSR-1649 Universal Data Coupler and a DSR-1300 series Digital Tape Recorder providing for either 7 or 9 track digital incremental,

or continuous, recording of data. The DRS-250 System has provisions for automatic data recording or for manual, operator, entry of data for identification of data, test site, or other parameters. The recording system provides for parity check and record-head echo-check to insure error free recording.

3.0 DRI-250 DIGITAL RECORDING INTERFACE

3.1 Input Data

The Model DRI-250 Digital Recording Interface accepts analog data for signal amplitude and receiver frequency and digital data for DRS-250 control, receiver band and attenuator setting.

3.1.1 Analog Data

The Model DRI-250 interface accepts 0-1.5 Volt analog signals corresponding to log signal amplitude (dB) and relative frequency from the receiver. The DRI-250 has an input impedance of 10K ohms $\pm$ 1% which is compatible with the Fairchild/Electro-Metrics Corporation's Model EMC-10 and EMC-25 receivers. The frequency response of the two analog input channels is DC to 100 kHz.

The DRI-250 analog input channels feed identical A/D converters which provide for amplitude resolution of 1.5 Millivolts and an accuracy of 1% of full scale relative to the analog input data.

3.1.2 Digital Data

Digital data input channels are provided in the DRI-250 interface for control, band sense, and attenuation.

The control signal consists of 0 VDC while a receiver frequency scan is in progress. When the scan ends, the control signal becomes $\pm$ 24 VDC.

The attenuator input sense consists of five (BCD) digital input lines for attenuator sense. If a programmable step attenuator is in use which allows sense of attenuator setting this data will automatically be entered on tape. If the attenuator sense is not available, attenuator setting information may be entered manually on the DSR-1649 coupler. Logic for attenuator sense is the same as for band sense.

The input impedance for all digital inputs is greater than 1 K ohm.

3.2 Data Format

The DRI-250 output data format is as follows:

3 Bits System Recognition Code.

5 Bits of RF attenuation (for use with special programmable step attenuator).

4 Bits of band code.

10 Bits of frequency data.

10 Bits of amplitude data.

1 Bit control signal to DSR-1649 coupler.

4.0 DSR-1649 DATA COUPLER AND

DSR-1300 TAPE DECK

The DSR-1649 Universal Data Coupler provides for complete control of the recording system and for manual data entry and automatic checking of recorded data for parity errors. The DSR-1300 tape unit accepts and records all data in IBM compatible format.

4.1 Coupler and Tape Deck Specifications

The specifications for the DSR-1649 coupler and DSR-1300 tape unit are given in an appendix.

5.0 DSR-250 OPERATION

For automatic recording of data from the EMC-25 receiver or FSS-250 Spectrum Surveillance System, the following steps are required:

5.1 FSS-250 System Setup

The FSS-250 Spectrum Surveillance System should be set up for a frequency scan in accordance with the system operation instructions. No special operation of the FSS-250 is required for recording with the DRS-250 System.

5.2 DRS-250 System Setup

The DRS-250 System should be set up for recording as follows:

1. Load and thread tape on the DSR-1300 tape deck.
2. Turn on tape deck power.
3. Place tape control in "Record" position.
4. Press Beginning Of Tape "BOT" control.
5. Enter identification data on the DSR-1649 coupler by loading data into the thumbwheel switch register and pushing "FIX DATA" then "IR Gap". This will enter the desired fixed data and insert an inter-record gap preparing the system for the next data record. The following fixed data sequence is suggested.

   Bits 1 - 3 System recognition code.

   Bits 4 - 9 Test identification (any suitable customer selected binary identification code.)

Bits 10 - 12 RF attenuator setting (only if auto-attenuator sense is not in use.)

6. Place "EXT START/INT START" switch in "EXT START" position. This will allow the FSS-250 system (or EMC-25 receiver) to start and stop recording as required.

After the above steps are completed, the system is ready to accept data. The FSS-250 system or EMC-25 receiver scan can be started in the normal fashion. When the scan begins the DRS-250 system will automatically begin recording data and will continue until the scan ends. The DRS-250 will automatically stop when the scan ends (when the FSS-250 completes its scan of one or more bands).

The DRS-250 system may be stopped at any time by pressing "STOP" and moving the control switch to "INT START".

Steps 5 and 6 can be repeated as often as required as long as it is desired to record data (and sufficient tape remains). When the operator desires to change tapes the following steps should be accomplished:

a. Place control switch in "INT START"

b. Open tape deck door

c. Push End-Of-File, "EOF"

d. Move switch to "Rewind".

After the tape is rewound, the operator can load a new tape and repeat steps 2 - 6 above to start recording on a new tape. The tape which is removed should be

carefully stored in a protective container and should not be subjected to magnetic fields from any electronic equipment or to heat from any source.

Additional operating data is included in the appendices.

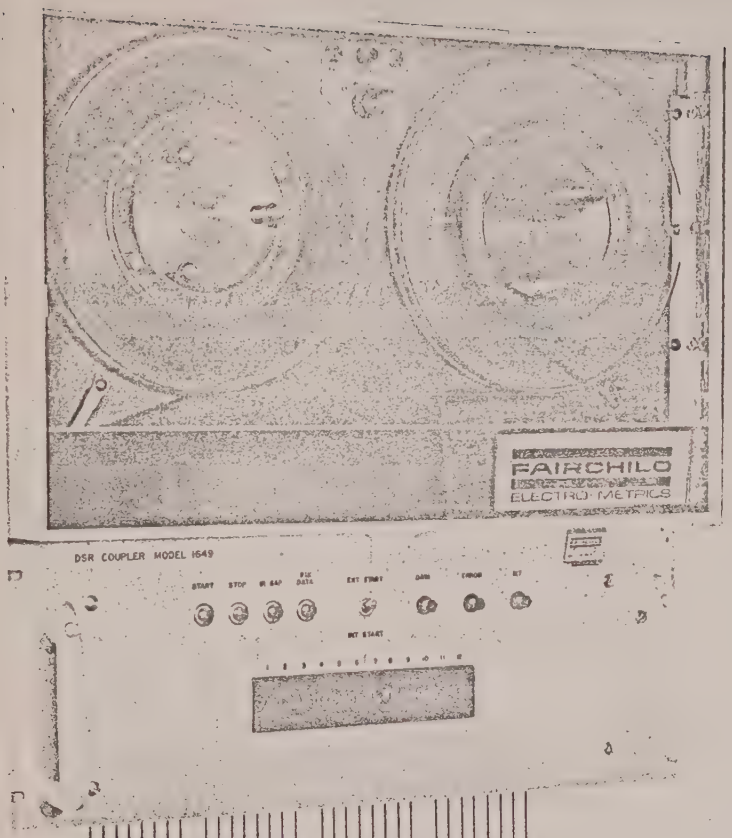
APPENDICES

SPECIFICATIONS

DSR-1649 UNIVERSAL COUPLER

DSR-1300 TAPE DECK

A/D CONVERTER



APPLICATION

The Model 1649 Universal Coupler was designed to record digital information on magnetic tape with F/EMC Incremental Tape Recorders. Data from counters, analog to digital converters, digital voltmeters, time clocks, and other digital sources can be recorded. The data is recorded on IBM computer campatible ½ inch magnetic tape, either 9 track or 7 track depending on the tape unit selected.

DESCRIPTION

The Model 1649 Universal Coupler operates in conjunction with a F/EMC Incremental Tape Recorder. The Coupler is powered by the Recorder's power supply. Inter-record gap and stepping commands are furnished by the Coupler to the Recorder. Gap in process, echo check, and end of magnetic tape signals are furnished by the Recorder to the Coupler.

INPUT DATA

The 1649 Coupler accepts up to 128 lines of input data for recording in the (8 or 6) tracks of the computer tape. This input data is sampled and recorded in (8 or 6) bit characters. The basic model has an input capability of 4-8 bit characters (32 lines). Additional 4 x 8 groups (32 lines) can be added to the maximum total of 128 lines.

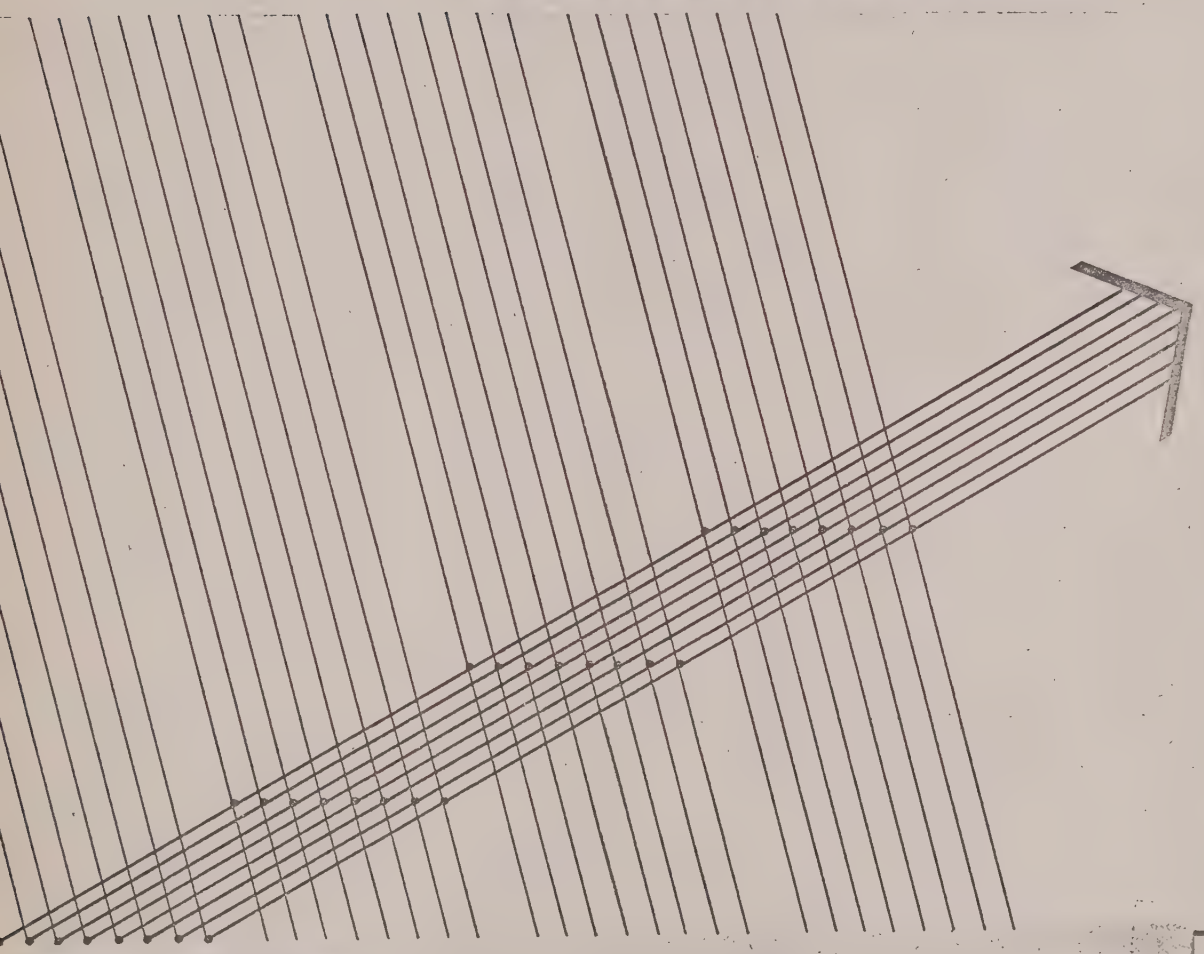
FAIRCHILD

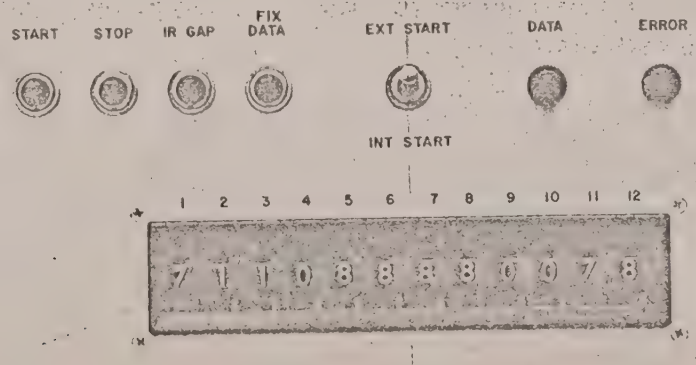
ELECTRO-METRICS
CORPORATION

A SUBSIDIARY OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

100 CHURCH STREET • AMSTERDAM, NEW YORK 12010

PRODUCT DATA





OUTPUT CODE AND FORMAT

The data is recorded on computer compatible magnetic tape by the companion F/EMC Recorder. Eight (or six) data lines are examined for each character and the number of characters recorded before the Coupler recycles is selected by the binary weighted WORD LENGTH program connector. An inter-record gap is automatically inserted on the magnetic tape when the number of words is equal to the number set by the binary weighted RECORD LENGTH program connector. 7 Track BCD, 9 Track EBCDIC or Packed Decimal can be written by wiring appropriately at the input connectors

TYPICAL SYSTEM APPLICATIONS

The output lines from the digital voltmeter or counter are converted if necessary (standard input logical 0=0V, logical 1= +3V to +6V) to an acceptable range of +3V to +6V for a logic "one" and 0V for a logic "zero". Isolated contacts may also be used for data input with an open contact being recorded as a "one" and a closed contact to ground (logic common) as a "zero". The rate of recording is set in the coupler to match the associated recorder. This is the character sample rate of the data lines. The sampling of the data lines is initiated by the control pulse put on the START line or by the internal clock. The BUSY line from the coupler will inform the data source that the recording of the information on the data lines is complete and to prepare the next word if in the external start mode.

One Fixed Data word on the coupler's 12 thumbwheel switches is entered by the coupler each time the FIXED DATA pushbutton is depressed or commanded remotely. An IR Gap may be manually inserted on the tape with the IR GAP pushbutton. When the START pushbutton is operated, upon entering Fixed Data, and after every inter-record gap, a reset control pulse automatically sets the logic in the coupler to the proper state. The START and STOP pushbuttons control the coupler which operates in accordance with the RATE switch, WORD LENGTH and RECORD LENGTH selected by the respective internal controls.

EXTERNAL CONTROLS

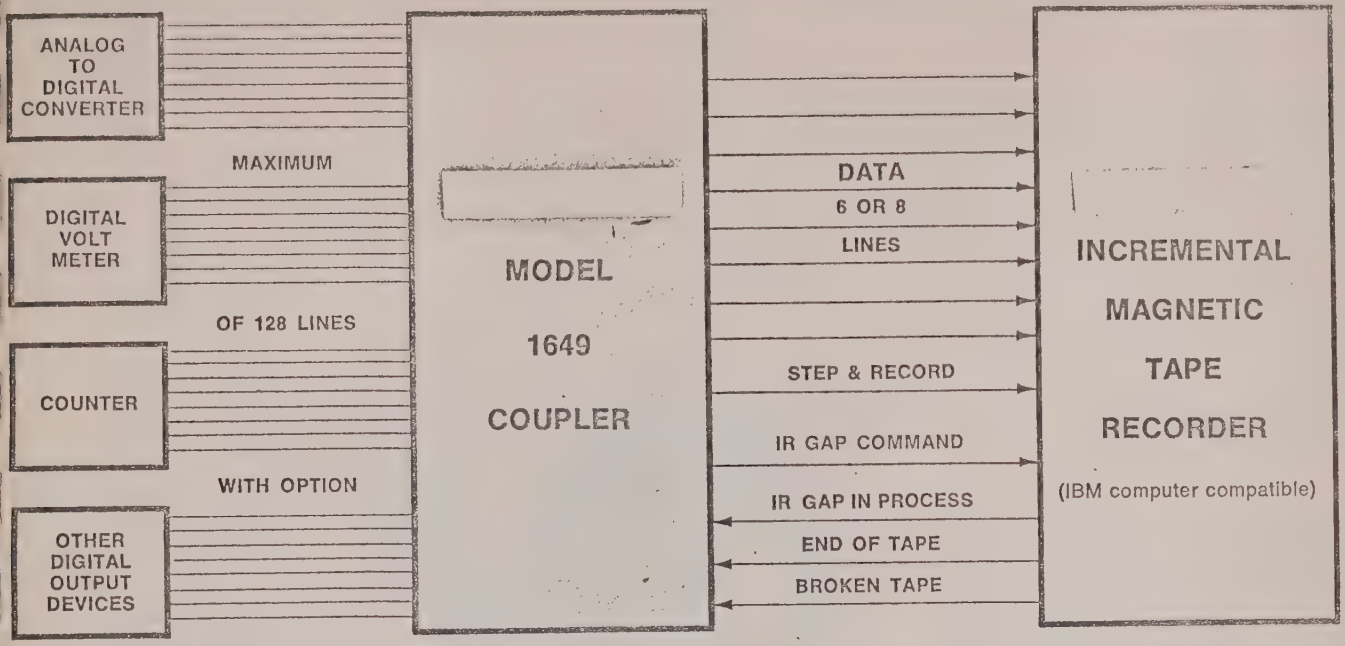
Control	Description
START	Resets the indicators, record length, and word length counters and causes the first measurement to begin.
STOP	Stops the conversion process at the end of a magnetic tape record after the automatic IR gap insertion.
IR GAP	Generates a magnetic tape inter-record gap. Normally used to create a gap following the entry of fixed data.
EXT. START/INT. START	Selects whether start of each Word recording is triggered externally or within the Coupler.
FIXED DATA	Writes 12 characters on magnetic tape representing the settings of the 12 thumbwheel switches.

INDICATORS

Indicator	Description
DATA	Indicates data and its correct lateral parity are being recorded.
ECHO	Indicates the recorder failed to write the correct lateral parity.
MT	Indicates the end of magnetic tape marker has been sensed or the magnetic tape is improperly loaded.

INTERNAL CONTROL

Control	Description
WORD LENGTH	The number of characters to be recorded for each measurement.
RECORD LENGTH	The number of words to be written for each magnetic tape record.
RATE	The word sampling rate when in internal start mode.

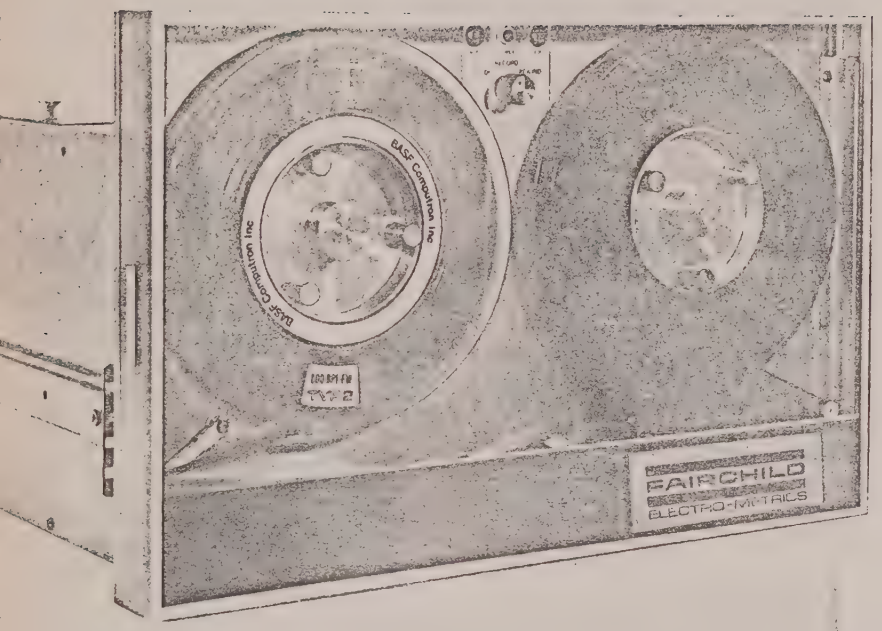


FEATURES

- ☐ Zero to 300 characters per second, 0 to 500, 0 to 1200 recording rate internally adjustable
- ☐ Converts 32 input data lines of information to 4-8 bit IBM character words
- ☐ Additional input available in 32 line groups to a maximum of 128 lines
- ☐ Selectable 1-16 characters per word of input data line information
- ☐ Selectable 1-4095 words per record
- ☐ Tape parity—Recorder generated, odd or even as required
- ☐ Records IBM compatible magnetic tape
- ☐ Provision for either manually or automatically selecting and recording 12 character "Fixed Data" words
- ☐ Start signal from data source initiates examination of data lines and recording of data word when in external mode
- ☐ Busy signal when coupler is recording characters, IRG, EOF, or BOT mode

FAIRCHILD
ELECTRO-METRICS CORPORATION
A SUBSIDIARY OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION
100 CHURCH STREET • AMSTERDAM • NEW YORK 12010 • 518 843-2600

SERIES



Choice of Incremental & Continuous Models

Range of Asynchronous & Continuous Speeds

Guaranteed Computer Compatibility, including IBM 360

High Quality—Low Price through Simplified Design

High Reliability

I C Compatible Interface

Ceramic Tape Guides

Built-in Noise Immunity

Controls Inside Door— Prevent Inadvertent Data Destruction

Precise Head Alignment

Rack Slides Provided with Each Unit— Give Easy Access to Rear of Unit

DC Erase Head for Maximum Reliability

Several models are available within the 1300 Series. The major differences in these models are: incremental and/or continuous input speed capability, the number of tracks, and the character packing density. A number of options such as read electronics, error checking and power options are also available. Some models have these particularly interesting features: fast gap, speeds up to 500 characters/sec., capability to read and write at high speeds, recorder clock output, head current echo check parity generation, and IR gap elimination with the Zero Data Loss (ZDL) interface.

The Digi-Data 1300 Series of digital magnetic tape recorders is designed for data recording in a form compatible with computer input drives. Compatibility, even with the more stringent requirements of the IBM 360, is guaranteed to be well within the computer requirements for accurate data transfer. The Series incorporates the years of experience of Digi-Data engineering in a low cost, high quality, highly reliable design.

Some of the design goals of the 1300 Series are: complete computer compatibility, reliability, convenience, maintainability and simplicity, and economy. The methods used in the 1300 to meet these goals are described below.

All of the tape handling components are mounted on a precision plate. Precision components are used to assure computer compati-

A Flexible Digital Tape Series with Combinations of Write, Read, and Incremental and Continuous Operation.

bility. Precision head alignment assures minimum skew without electronic deskewing. Tape guiding is performed by accurately aligned ceramic guides. A pinch roller acts as a skew controlling element while assuring that no tape slippage will occur. The high detent force of the stepping motor also assures that no tape slippage will occur. For example, 450 oz. of tape tension are required to slip the stepping motor detent on a typical machine.

The tape is controlled by a capstan directly mounted on the motor shaft—no gears. The reels are controlled by a system with no wearing parts and requiring no adjustment. Tape tension is maintained at a nominal 7 oz.; tension in this range is desirable to assure accurate recording. A heavy duty fan is provided to maintain the temperature inside the unit near ambient.

The 1300 Series is designed to interface with IC outputs. Noise immunity is designed into these circuits; however, a high level interface is also available for noisy environments. All of the electronics necessary for writing computer compatible tape are provided. To assure that the recorder will not become obsolete, the 7 track unit has been designed to be easily converted to another character packing density or to 9 tracks.

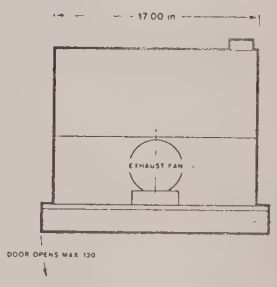
This is the simplest means available for preparing computer compatible tape. All that is required is your data (6 or 8 lines), a record command, and an inter-record gap command. If you wish a Zero Data Loss (ZDL) interface can be provided to allow data input without concern about inter-record gaps.

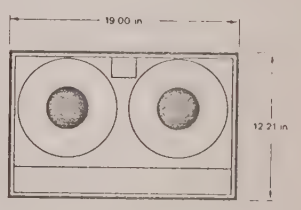
The 1300 records a data character from the input lines each time that a record command is received. The requirements for computer compatibility are provided within the 1300 recorder. These include: parity bit generation for each character, inter-record gap generation upon command, generation and insertion of the gap characters, computer compatible character spacing, computer compatible skew control, end of file gap upon command, and generation and insertion of the "End-of-File" character.

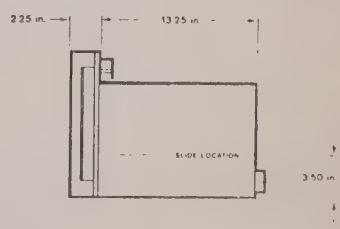
The standard incremental recorder is available with an option for continuous (slew) recording at a rate between 1000 to 4000 char/sec. A gated clock output is provided. On command the unit will start and then supply clock pulses for use in your system. This timing will assure proper packing density on the recorded tape. When an IR gap is commanded the pulses will be inhibited and a gap with check characters will be written. The tape can be stopped and started in the IR gap.

A continuous only tape unit can be supplied with a speed of 10 ips. Other speeds are available as an option. A gated clock and all IBM compatibility features are provided.

Continuous (slew) read is available as an option on the incremental recorder or as a read only unit or as a continuous write, continuous read unit. The read speed is dependent upon the model. Speeds from 1000 to 8000 char/sec are available.







DSR SERIES

TAPE WIDTH ½ inch

EOF GAP IBM Compatible End of File (EOF), including Check Character

REEL SIZE 8½ inch (1200 ft. of 1.5 mil tape)

LOAD TAPE Automatic advance to load point (BOT)

END OF TAPE SENSING
Reflective marker sensed by photocell

REWIND Less than 3 minutes

LATERAL PARITY Odd, internally generated, even (7/track)

HEAD CURRENT ECHO CHECK OPTION
Parity check of data as written

BIT SPACING ACCURACY
± 2% typical
± 5% worst case

INTERCHANNEL DISPLACEMENT ERROR
± 180 u inches @ 800 BPI
± 250 u inches @ 556 & 200 BPI

TAPE TENSION — 7 oz nominal

INPUTS* Logical 0 = 0 Volts ± .5V, Logical 1 = + 3 Volts, or greater; 3.0 KΩ to ground
Data (6 or 8 lines)
Step and Record
IR Gap
Remote Controls

OUTPUTS* Logical 0 = < .2 Volts, Logical 1 = + 6V at 750 ohms
Beginning of Tape (BOT)
IR Gap in Process
End of Tape
Broken Tape
Head Current Echo Check (Optional)
Read Data (Optional)

SIZE 19" Rack mounting, 12¼" high, 14" deep

WEIGHT 38 pounds

PANEL CONTROLS On-off/rewind/record, BOT, EOF

ACCESS Rack slides

POWER 105 to 125 Volts, 50 or 60 Hz, 1.5 amps.: DC, 220V or 400 Hz. available as an option

** Other inputs and outputs are provided with some options.*

OPERATING ENVIRONMENT 32° to 131°F; humidity to 100% relative without condensation

ALTITUDE 0 to 25,000 ft.

SHOCK 6 inch drop on any axis

VIBRATION 1.8g 10 cps to 500 cps, sinusoidal

9 TRACK

RECORDING RATE 0-300 (1339), 0-500 (1359) char/sec., Incremental 10 ips (1309), continuous

PACKING DENSITY 800 BPI

NUMBER OF TRACKS 9 (IBM compatible spacing)

IR GAP IBM compatible gap—high speed
1339-800 240 ms
1359-800 290 ms

CHECK CHARACTERS LRCC, CRCC

7 TRACK

RECORDING RATE 0-300 (1337), 0-500 (1357) char/sec., Incremental 10 ips (1307), Continuous

PACKING DENSITY 200 or 556 BPI

NUMBER OF TRACKS 7 (IBM compatible spacing)

TAPE WIDTH ½ inch

IR GAP IBM compatible gap—high speed

1337-200	120 ms	1337-556	240 ms
1357-200	140 ms	1357-556	270 ms

CHECK CHARACTERS LRCC

OPTIONAL ITEMS
- ☐ Head Current Echo Check
- ☐ Slew Read
- ☐ Slew Write
- ☐ High Level Inputs

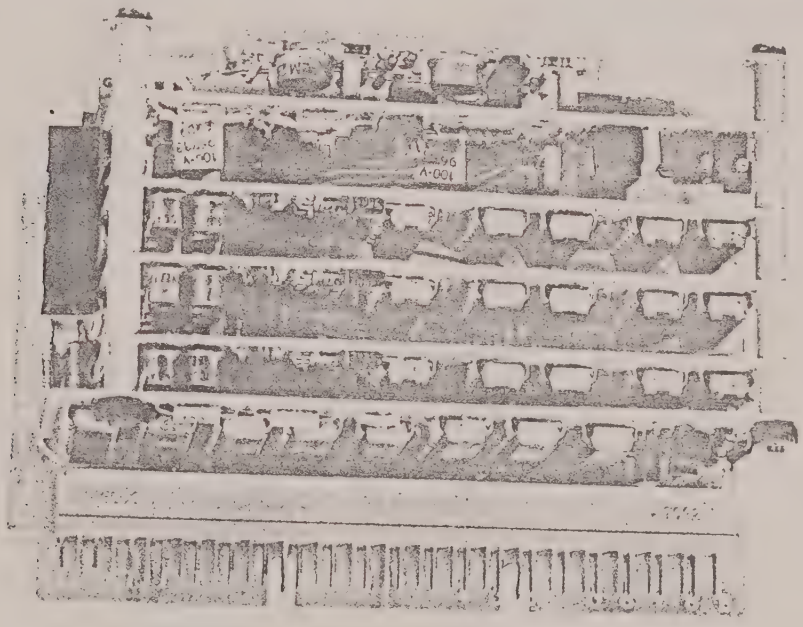
MODEL NUMBERING

13 X X — XXX
- 13 — Series Number
- X — Incremental Recording Rate (100's char/sec)
- X — Number of Tracks
- XXX — Packing Density

FAIRCHILD
ELECTRO-METRICS
CORPORATION
A SUBSIDIARY OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION
100 CHURCH ST., AMSTERDAM, NEW YORK 12010

ANALOG-TO-DIGITAL CONVERTER

PRODUCT DATA



- Bipolar or Unipolar inputs
- Parallel data output and its complements
- Serial data output and its complements
- 8, 9, 10, 11, or 12-bit conversion
- 3-Digit BCD conversion
- Up to 1 microsecond per bit conversion rate
- High input impedance amplifier
- Digital inputs and outputs DTL or TTL compatible
- Internal or external bit clock
- Documentation to simplify system design

FAIRCHILD

ELECTRO-METRICS CORPORATION

A SUBSIDIARY OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION

Input Impedance
(10 volts full scale) ..... 10k ohms
High Input Impedance
Amplifier ..... 10 megohms
Linearity ..... 1/2 LSB
Accuracy ..... 0.0125% (for 12 bits)
Temperature Coefficient ..... 20 ppm/°C
Conversion Rate ..... 1 microsecond per bit up to 10 bits
Operating Temperature Range .. 0°C to +70°C

Output Levels
Logical One (TTL/DTL compatible) ..... +2.4 v min.
Logical Zero (TTL/DTL compatible) ..... +0.4 v max.
Start Conversion ..... DC-coupled change from One to Zero

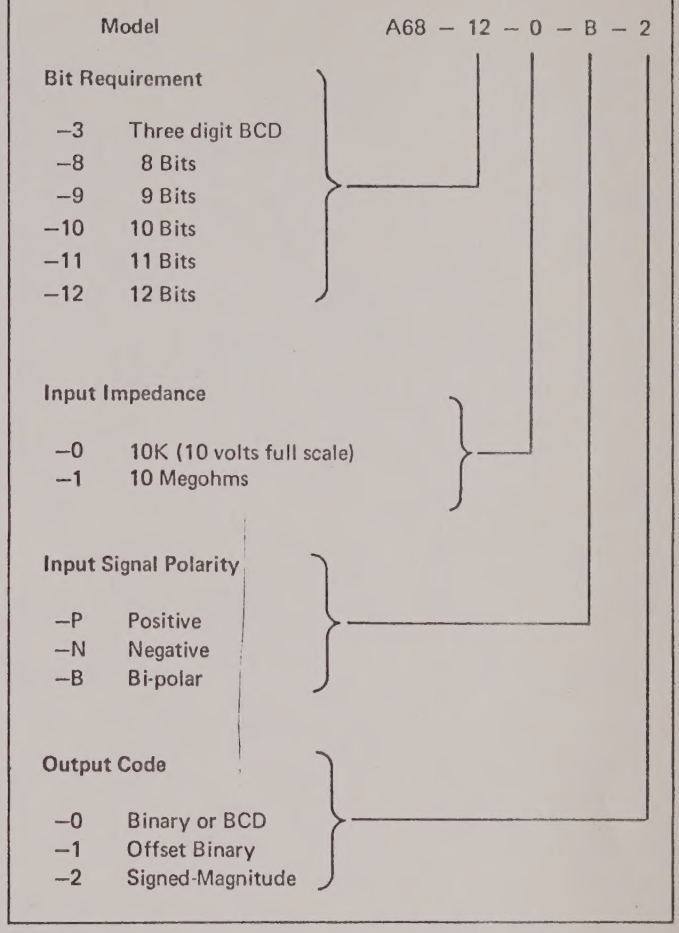
Analog Input Voltage*
0 to +10 volts
0 to −10 volts
−10 volts to +10 volts

Output Codes
Parallel ..... Binary, BCD, Offset Binary, Signed-Magnitude Binary
Serial ..... NRZ-L

Power Supply Requirements
+5 volts, ±5% @350 ma.
+15 volts (stable to ±5%†) @75 ma.
−15 volts (stable to ±5%†) @90 ma.

Mechanical
Size ..... 3.3"Hx4.65"Wx1.2"D.
Mating Connector ..... 40-pin Elco Varicon

*For other voltages consult factory.
† For 11 or 12 bits the supplies must be stable to ± 2%.



Function	Pin Number
Start Conversion 1 (input)	21
Clock Input	24
Analog Input	35
Clock Output	14
$\overline{\text{Clock Output}}$	25
Start Conversion 2 (output)	39
End of Conversion	33
$\overline{\text{End of Conversion}}$	29
Serial Data	37
$\overline{\text{Serial Data}}$	38
2^{-1} (MSB)	27
$\overline{2^{-1}}$	28
2^{-2}	31

Function	Pin Number
$\overline{2^{-2}}$	30
2^{-3}	32
$\overline{2^{-3}}$	26
2^{-4}	22
$\overline{2^{-4}}$	23
2^{-5}	20
$\overline{2^{-5}}$	19
2^{-6}	17
$\overline{2^{-6}}$	18
2^{-7}	15
$\overline{2^{-7}}$	16
2^{-8}	4
$\overline{2^{-8}}$	5

Function	Pin Number
2^{-9}	13
$\overline{2^{-9}}$	12
2^{-10}	10
$\overline{2^{-10}}$	11
2^{-11}	9
$\overline{2^{-11}}$	8
2^{-12}	6
$\overline{2^{-12}}$	7
Digital Ground	2
+5 Volts	3
Analog Ground	34,36
+15 Volts	40
−15 Volts	41

FAIRCHILD
ELECTRO-METRICS CORPORATION
A SUBSIDIARY OF FAIRCHILD CAMERA AND INSTRUMENT CORPORATION
100 CHURCH STREET • AMSTERDAM • NEW YORK 12010 • 518 843-2600

MP MASTER
MA30026